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**PHOTOGRAPHIC INTERPRETATION REPORT**

**LAUNCH COMPLEX A  
SARY-SHAGAN ANTIMISSILE TEST CENTER, USSR**

MARCH 1966  
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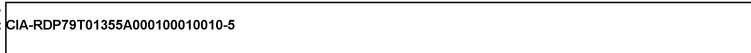
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PHOTOGRAPHIC INTERPRETATION REPORT

# LAUNCH COMPLEX A SARY-SHAGAN ANTIMISSILE TEST CENTER, USSR

MARCH 1966

NATIONAL PHOTOGRAPHIC INTERPRETATION CENTER

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## INTRODUCTION

This report has been prepared in response to CIA requirement C-S15-82,245 and Supplement 1. Stated briefly, mensural data, identification, analysis, and line drawings of all the electronic and launch components at Launch Complex A, Sary-Shagan Antimissile Test Center (SSATC), USSR, (Figure 1) were requested. Mission [redacted] [redacted] was cited in the requirement and the information furnished herein is limited to that mission unless otherwise specified. Certain line drawings requested, such as overall diagrams of launch sites, are part of an intensive and basic compilation currently in progress which will be a follow-on effort to standardize basic compilation data, not only at Launch Complex A, but of the entire SSATC. In the meantime, this report furnishes photographic enlargements that should suffice. All other analytical data requested is furnished herein.

Mission [ ] photography of Launch Complex A (Figure 2) is generally of excellent interpretability and has made it possible to make a number of identifications not previously possible. Because of the details obtainable from this photography, and the specific answers requested in the requirement, this report tends to be specific. As good as this photographic mission was, however, there are areas where the imagery is sufficiently small to be variously interpreted including the tracking/guidance radar at Electronic Site B, reported herein as a new type, and certain launcher details at Launch Sites 3 and 4.

The mensural data in this report has been accomplished by the Technical Intelligence Division/Technical Analysis Branch (TID/TAB). The TID/TAB furnished overall dimensions such as length, width, and height, but there are instances where certain fine-line detail has been accomplished by the photographic interpreter.

## LAUNCH SITES

At the time of Mission [REDACTED] the launchers and the support equipment in both Launch Site 1 (Figure 3) and SSATC SAM Site B04-2 were similar and normal to the SA-2 SAM system.

Launch Site 2 (Figure 3) is unoccupied.

Launch Sites 3 and 4 (Figure 4) are different from Launch Site 1. The tracking/guidance radar at Launch Sites 3 and 4 is not at the center of the launch ring nor is it the same type of radar observed at Launch Site 1. All 4 launch sites do have approximately the same diameter. Launch Site 1 contains a seventh position adjacent to the perimeter road between launch positions 1 and 2.

## LAUNCH SITE 1

## The Guidance Area

The guidance area is at the hub of a hexadic launch battery and the launchers are deployed in a semicircular pattern. The guidance radar is identified as a FAN SONG. The radar has a conventional configuration and normal dimensions [redacted] long. The vertical trough at the end of the array is difficult to see because it is tilted so that its long axis parallels the rays of the sun. Also, for this reason, it casts a small shadow. A probable FAN SONG is also in the guidance area.

Southeast of the FAN SONG near the edge of the hub is a dome  in diameter.

Supporting equipment is normal and includes 1 cargo truck, 4 generator/checkout vans [redacted] wide), 2 generators [redacted] and 2 guidance equip-

## Launch Components

To the extent they can be measured, the launchers appear similar to the SA-2 SAM system launchers. The lengths of certain of the launchers vary by actual measurement because they are variously elevated with respect to the horizon. Those launchers in the horizontal position, however, appear similar to the GUIDE LINE launchers. Launchers 2, 3 and 5 are in the horizontal position and measure approximately

long to the rear of the flame deflector. Launchers 1 and 4 are partially elevated so their true length cannot be determined. Launch position 6 is unoccupied and an extra position with a launcher, designated launch position 7, has been constructed adjacent to the perimeter road, between launch positions 1 and 2. This launcher has an approximate overall length

## Support Equipment

Support equipment adjacent to Launch Site 1 is normal to the SA-2 SAM system. This includes 6 cargo trucks/vans, each [ ] long; 3 cranes, [ ] long; approximately 8 sets of bogie wheels, each of which measures [ ] in length from the front to the rear wheels; 4 missile transporters, [ ] long, and 6 equipment vans,

A ramp, a small building, and a large building are also in the hub of the launch site.

## LAUNCH SITE 2

Launch Site 2 is unoccupied. Neither guidance nor launch components are present. A building, 30 feet long by 20 feet wide, and a building, 75 feet long by 40 feet wide, are in the hub of the launch site. Twelve vehicles, each approximately  are parked inside the inner security fence of this launch site.

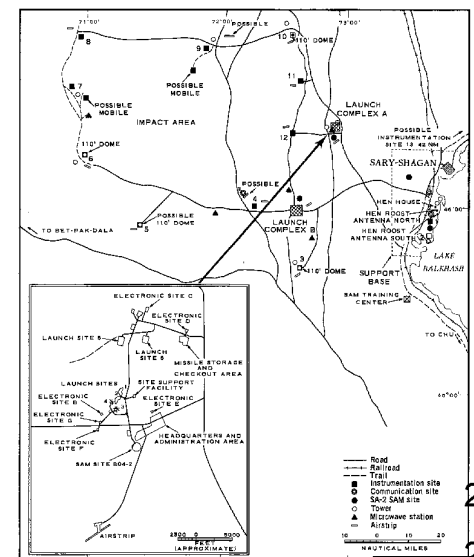


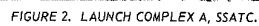
FIGURE 1. LOCATION OF LAUNCH COMPLEX A, SARY-SHAGAN ANTI-MISSILE TEST CENTER, USSR.

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#### SPOON REST ACQUISITION RADAR

A SPOON REST antenna on a van approximately [ ] long, a power van approximately [ ] long, and a small building are positioned between Launch Sites 1 and 2.

#### SITE SUPPORT FACILITY

This site (Figure 4) was previously designated Electronic Site A. 1/ However, no antennas or other electronic components can be identified; therefore, it is now designated site support facility.

Identifiable components in this facility include a generator, two [ ] long missile transporters, a [ ] long prime mover, a probable launcher [ ] long overall, and numerous dark objects near the center of the facility which are too small to be identified.

Three vehicles are in motion on the road near the entrance to the facility.

#### LAUNCH SITES 3 AND 4

Launch Sites 3 and 4 (Figures 4, 5, 6, 7, and 9) contain electronic and launch components which are most difficult to identify. In addition to scale limitations, the interpreter is viewing a new tracking/guidance antenna and an undetermined missile system.

#### Launch Components

Various dimensions were obtained from the launchers at Launch Sites 3 and 4, for several reasons. Some launchers were erected at various angles, giving misleading impressions of their true length; some were snow or canvas covered; and some were pointed into the sun so that shadow measurements were not obtainable. The line drawings included (Figures 6, 7, and 8) are therefore more representative than absolute.

#### Launch Site 3

Six launch positions are arranged in a circular fashion with a launch control center at the hub. Cables can be identified leading from the hub to the launch positions. An additional cable scar may be traced to the guidance facility, Radar Set B1 (Figure 10) of Electronic Site B, and to the common control center near the northeast side of Radar Set B3, a redundant radar to both Launch Sites 3 and 4.

Early acquisition and early tracking data is evidently obtained from Electronic Sites F and G (Figure 4), the TALL KING, BACK NET, SIDE NET sites. The interrelationship of various cable connections to the sites can be seen on Figures 4 and 5.

#### Types of Launchers

Figure 6 shows the general missile and handling features utilized not only at all the launch positions of Launch Site 3, but also at Launch Site 4.

The figure shows the launcher at the apex of a V-pattern with an object at the end of each leg of the V. At each extremity of the V is an object which appears to be shorter than the one at the launch point. A generator is positioned midway between the 2 probable dollies at the extremities of the legs of the V.

Launch position 4 has the launcher positioned at right angles to the sun and affords the best opportunity to measure the launcher. Measurable imagery shows the launcher, erector, flame deflector, and protruding launch rail to have a combined length of [ ]. The height measures approximately [ ] and the width approximately [ ]. The height and width dimensions are not as reliable as the length.

Variations: Launch Positions 3 and 4. Launch positions 3 and 4 have environmental shelters at the missile-hold positions.

Launch Position 5. A revetment encloses launch position 5 (Figure 7) and gives the impression that it is larger than the other 5 launch positions. Measurements prove the distance from the extremity of each leg of the V to the launch point at all 6 positions is the same.

The launcher at position 5 has approximately the same dimensions as that shown in Figure 6.

Launch position 5 is the only position showing snow melt or removal between the extremity of each leg of the V and the launch point. This melt pattern shows that tracks extend from the extremity of each leg of the V toward the launch point in a converging pattern. Near the launch point, the tracks spread with one set of tracks extending to the launcher and the other set of tracks to an apron alongside the launcher.

Near the east side of the revetment enclosing launch position 5 is a 120-foot tower with a platform on the top.

#### Launch Site 4

Launch Site 4 is not sufficiently different from Launch Site 3 to warrant an individual discussion of each launch position. Figure 8 shows the general situation with 2 variations. The launch pads appear to be circular rather than rectangular, and a power van has been added in conjunction with the generator between the legs of the V.

As is the case at Launch Site 3, various measurements can be obtained from dimensions of equipment within Launch Site 4. This is especially true if measuring shadows rather than actual imagery. Inspection of the actual imagery, however, indicates these variations are illusions created by peculiarities of lighting and conditions stated above rather than actual differences in equipment sizes.

As at Launch Site 3, launch control for Launch Site 4 is apparently exercised from the hub or center of the site where cable conduits from each launch position merge. The center is occupied by 2 equipment-control vans, each [ ] 3 checkout vans, each [ ] 2 generators, each [ ] and 2 generators, each [ ]. This control center also contains a [ ] foot control bunker.

#### Electronic Components

The electronic components at Launch Sites 3 and 4 can be subdivided into 2 early acquisition/tracking sites and a tracking/guidance center.

Early Acquisition/Tracking Sites. The early acquisition/tracking components are at 2 sites which are designated Electronic Sites F and G (Figure 4).

Electronic Site F contains 2 BACK NETS with a measured length of [ ] 2 SIDE NETS with a measured height of [ ] 1 van-mounted unidentified antenna, 3 radar equipment vans which are used as the control center, 3 generators, and 7 generator/test equipment vans. The area also contains 2 possible antennas under environmental covers approximately 20 feet in diameter. One of these possible covered antennas is adjacent to a radar equipment van, 2 communications-type vans, and a small building. The second possible covered antenna is adjacent to 2 small buildings which are near the fence on the eastern side of the site. These possible covered antennas are not functionally identified, but both are cable connected to the control center of Electronic Site F.

Electronic Site G contains a TALL KING antenna on an

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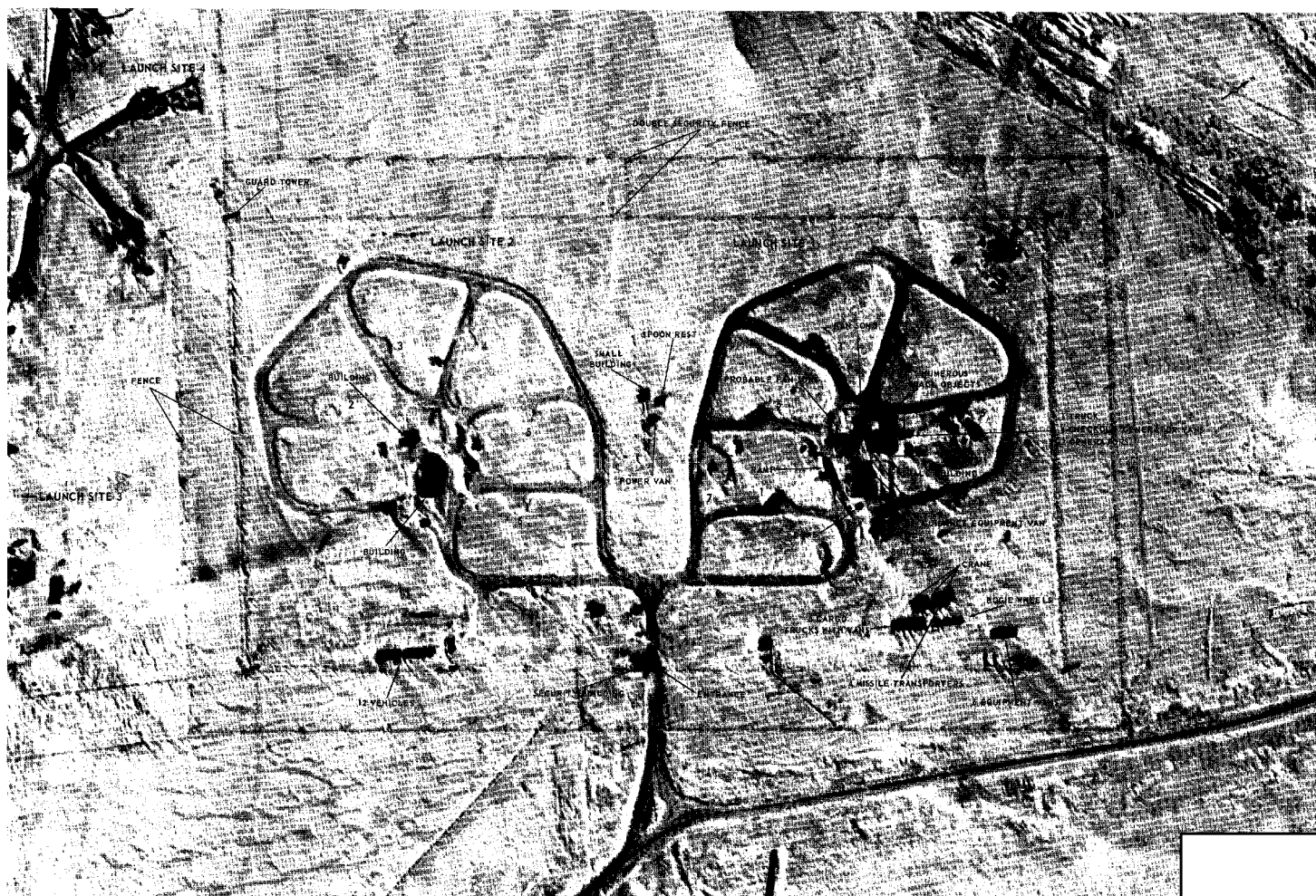


FIGURE 3. LAUNCH SITES 1 AND 2, LAUNCH COMPLEX A, SSATC.

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FIGURE 4. LAUNCH SITES 3 AND 4 WITH ASSOCIATED ELECTRONIC SITES B, F, AND G.

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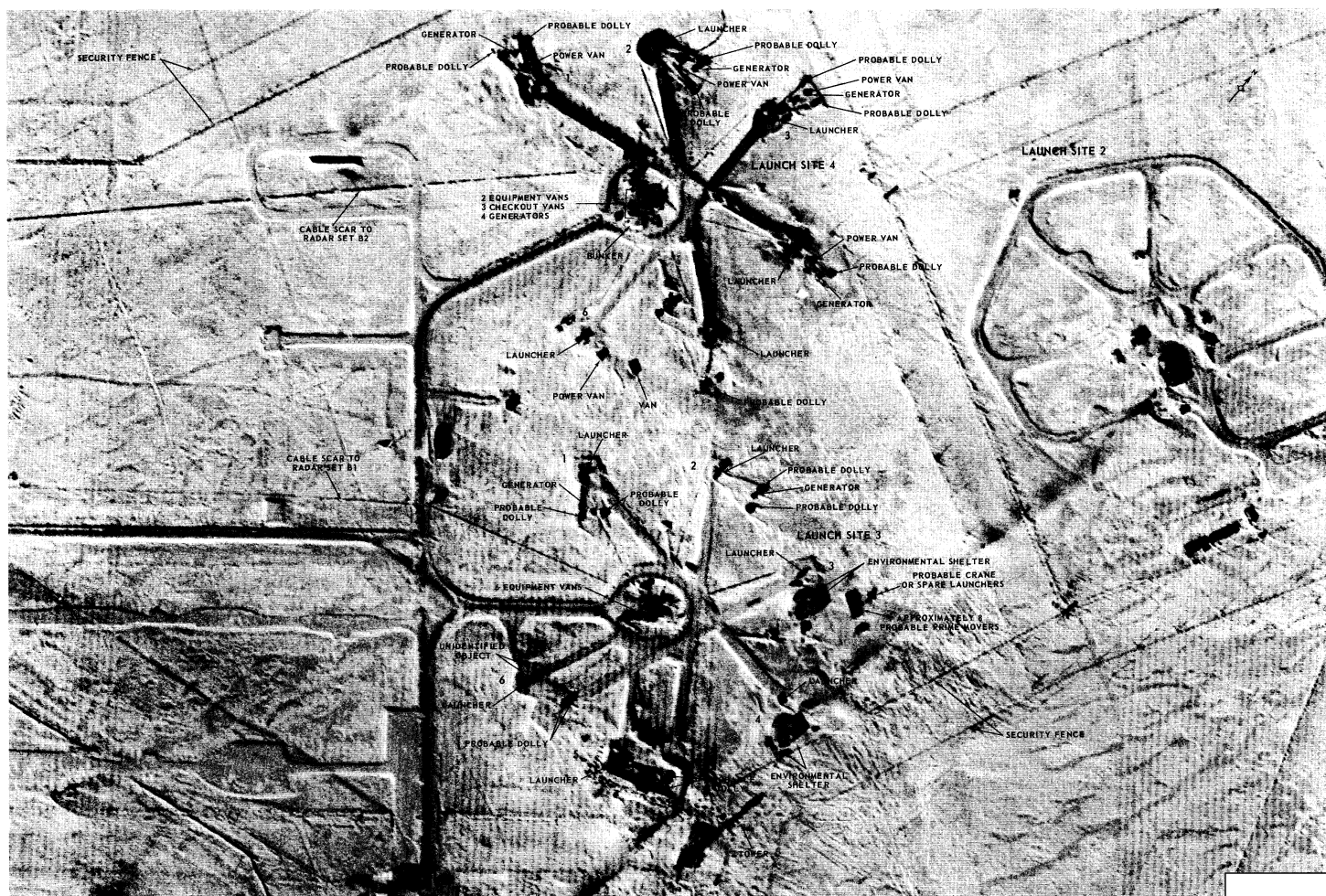


FIGURE 5. LAUNCH SITES 3 AND 4.

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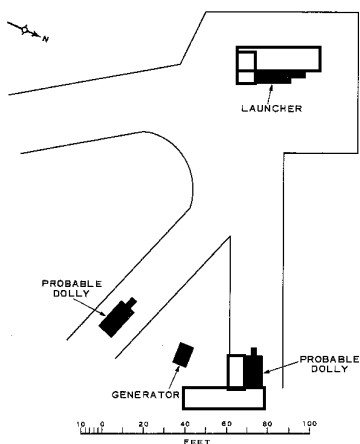


FIGURE 6. LAYOUT OF LAUNCH POSITIONS 1, 2, 3, 4, AND 6 OF LAUNCH SITE 3.

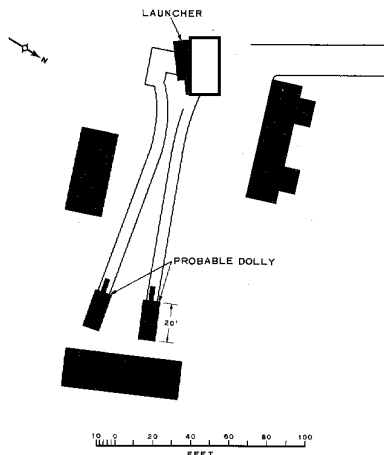


FIGURE 7. LAYOUT OF LAUNCH POSITION 5 OF LAUNCH SITE 3.

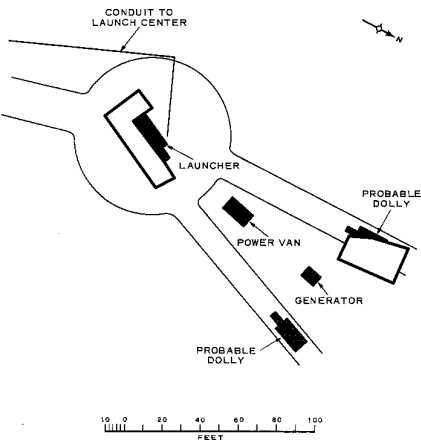


FIGURE 8. LAYOUT OF LAUNCH POSITIONS 1, 3, 4, 5, AND 6 OF LAUNCH SITE 4.

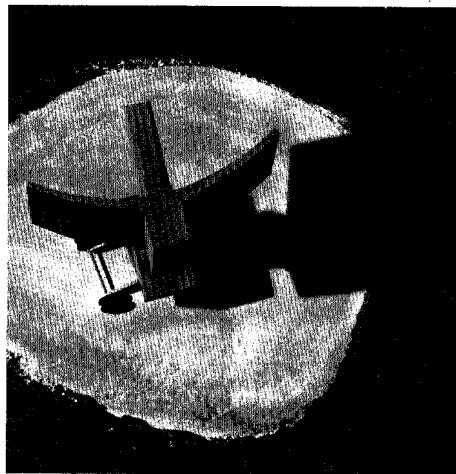


FIGURE 9. NEWLY IDENTIFIED SOVIET TRACKING/GUIDANCE SYSTEM.

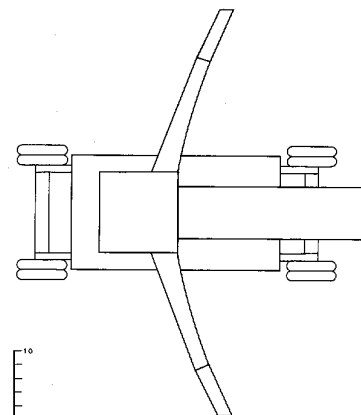


FIGURE 10. LINE DRAWING OF THE RADAR ARRAY AT ELECTRONIC SITES B1, B2, AND B3.

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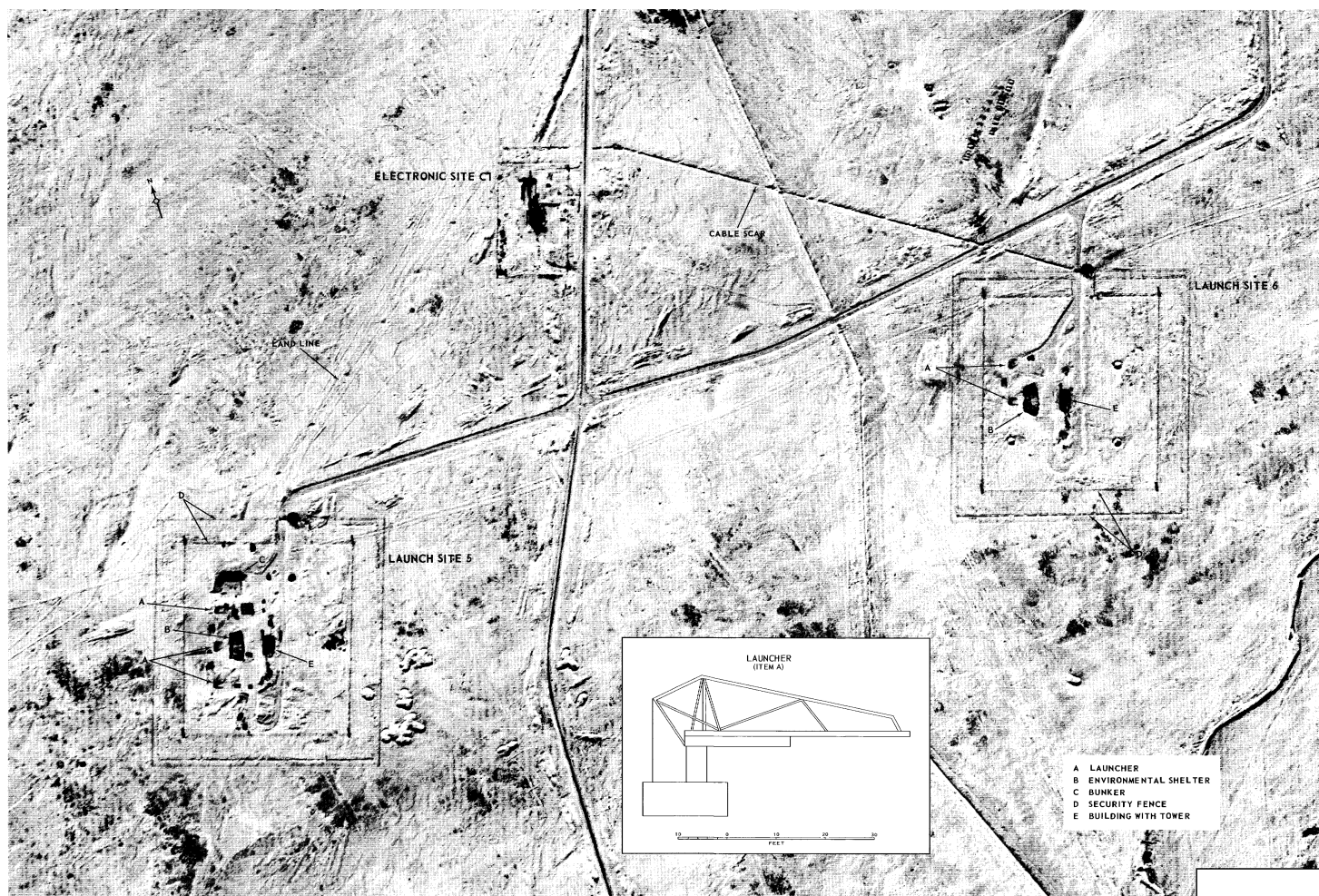


FIGURE 11. LAUNCH SITES 5 AND 6 WITH ASSOCIATED ELECTRONIC SITE C1.

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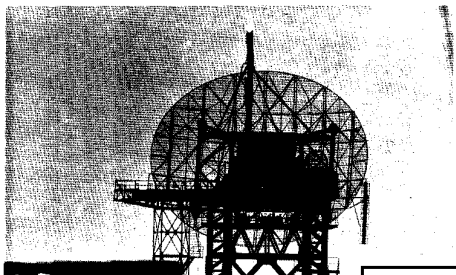


FIGURE 12. ANTENNA AT MYTISHCHI ELECTRONIC INSTITUTE (DATE UNKNOWN).

antenna building, a support building, 3 generators, and a buried fuel oil storage tank area. The antenna has been measured to be approximately 100 feet long, but because of its knife-edge taper, this length is not necessarily correct.

The TALL KING antenna is separately fenced, and is at 1 end of a T-shaped road pattern that interconnects the 3 guidance radar sets of Electronic Site B. However, no cable trace can be identified between Electronic Sites G and B.

#### Tracking/Guidance Center

The tracking/guidance center of Launch Sites 3 and 4 (Figure 4) is called Electronic Site B and is composed of 3 radar sets designated B1, B2, and B3. They are cable connected to Launch Sites 3 and 4. The center radar set, B3, is considered redundant; at a deployed site, 1 radar set for each launch site is the anticipated normal. The dual word tracking/guidance is utilized in this report because there is no way of determining from the available photography whether the set is utilized for target tracking, missile guidance, or both.

For the purposes of this report, the radar set at B1, B2, and B3 (Figures 9 and 10) is temporarily dubbed "Newly

Identified Soviet Tracking/Guidance Radar." The radar has a very gently curving reflector that appears rectangular when seen front on and from the ground and is approximately 30 feet long and 15 feet high. The overall height of the antenna, which is considered to be van mounted, is about 35 feet. It has a rectangular feed extending approximately 30 feet from the center of the reflector. The reflector appears to be solid from the shadow but a close mesh antenna could give the same appearance.

#### Launch Sites 5 and 6

**Launch Components.** The launch components at Launch Sites 5 and 6 are sufficiently large to be annotated on the face of the photography (Figure 11), making line drawings unnecessary. This excepts the launchers, the characteristics of which are described below.

There are 3 launchers at Launch Site 5 and 2 launchers at Launch Site 6, all of which are of identical construction. The shadow cast by the northernmost launcher at Site 6 (Figure 11) is best for interpretation and a line drawing (Figure 11, insert) has been prepared to show its dimensions and configuration. No doubt there are certain inner details of the steel lattice work present which are not shown. Only those features visible on the shadow have been drawn. It can be seen from the Figure 11 insert that, since there is a superstructure and a guy cable on top of the rail of the launcher, the missile must be slung underneath the rail. The overall length of the launcher, including a cable brace or winch at the rear, is [redacted]. Other dimensions can be measured directly from the figure insert.

**Electronic Components.** The radar array at Electronic Site C1 (Figures 11 and 13) is considered to be an early acquisition and tracking radar for Launch Sites 5 and 6. The array at Electronic Site C2 (Figure 13) is identical to Electronic Site C1 but has been deployed outside the precise geometrical considerations as Site C1. The tower at Electronic Site C2 (Figures 13 and 14) is not functionally identified. Electronic Site C2 apparently is not visibly connected directly to either Launch Sites 5 or 6.

The antenna at Electronic Site C3 (Figure 13) is under an environmental dome. As such, it cannot be identified but it is considered to be a final tracking radar and possibly guidance radar. The evidence leading to these interpretations is discussed below.

**Deployment of Electronic Site C1 and C2.** Electronic Site C1 is precisely the same distance from both of the northernmost launchers within Launch Sites 5 and 6. Electronic Site C1 is visibly connected to Launch Site 5 by a landline and to Launch Site 6 by a cable scar. Electronic Site C2 is not directly connected to either Launch Site 5 or 6, but is connected indirectly by a cable scar that leads to Electronic Site C1 and thence to the Launch Sites 5 and 6 as described above.

**Array Configuration of Electronic Sites C1 and C2.** The configuration of the arrays at Electronic Sites C1 and C2 is determined for the first time from Mission [redacted] therefore, it has been drawn in considerable detail (Figures 14 and 15).

The antenna at the Mytishchi Electronic Institute near Moscow (Figure 12) bore a strong similarity to one of the large parabolic dishes at Electronic Sites C1 and C2. Intensive analysis proved this to be correct. Measurements of the principal parabolic dish and the waveguide antenna obtained from excellent quality ground photography of the Mytishchi array proved the antenna to be identical to the antenna dishes of the same configuration at Electronic Sites C1 and C2. The Mytishchi photos, however, have never shown the parabolic antennas arranged back-to-back as they are at SSATC Electronic Sites C1 and C2.

To avoid confusing the 2 types of photography, it is necessary to state that all dimensions shown in Figure 15 and the array configuration were obtained from Mission [redacted]. The intricate detail, however, such as screen mesh, cross braces, and the construction of the tower were obtained from the ground photography. Although these drawings are useful in showing dimensional aspects of the array, there is no substitute for the detail that can be seen on the ground photography in Figure 12. Certain details invisible on the ground photography are concealed or masked on the aerial photography. Therefore, they can not be shown on the line drawings.

The line drawings and ground photography appear sufficiently revealing to omit an extended discussion of the various elements. However, certain information extrapolated from the drawings was prime evidence in considering Electronic Sites C1 and C2 to be early acquisition radar rather than guidance radar.

Figure 15 shows that it is [redacted] from waveguide to waveguide. A rapid rotational rate would literally cause

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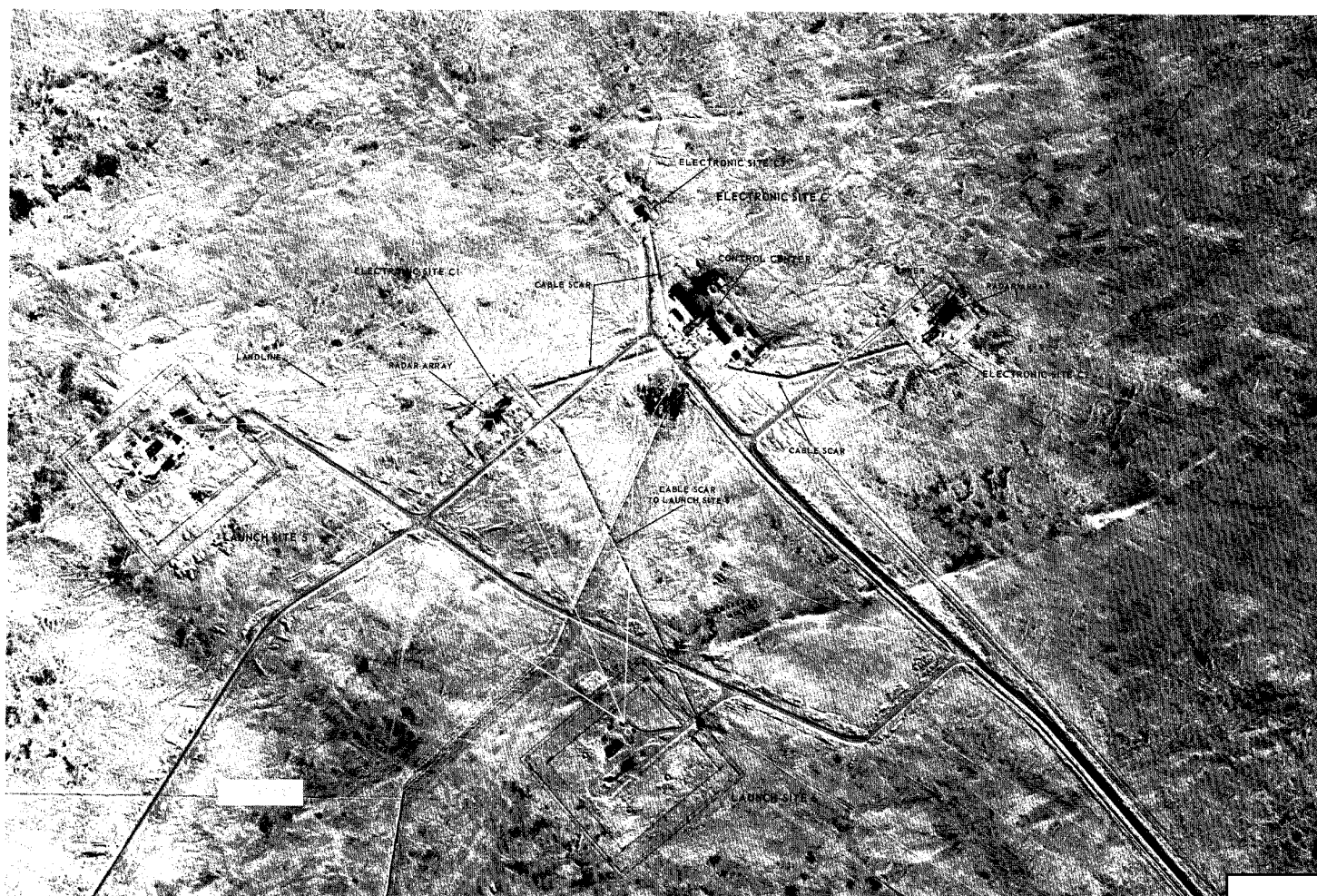


FIGURE 13. LAUNCH SITES 5 AND 6 WITH ASSOCIATED ELECTRONIC SITES C1, C2, AND C3.

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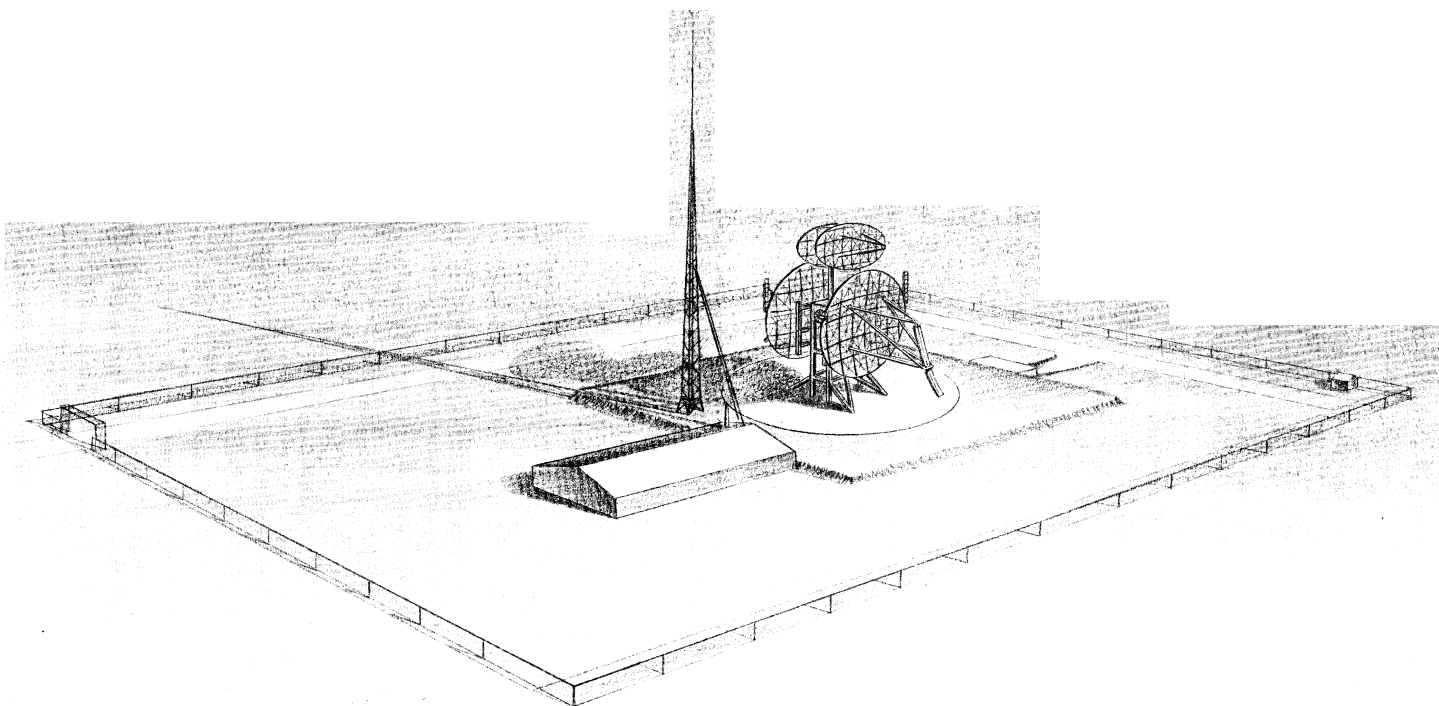
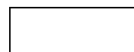


FIGURE 14. PERSPECTIVE VIEW OF ELECTRONIC SITE C2.

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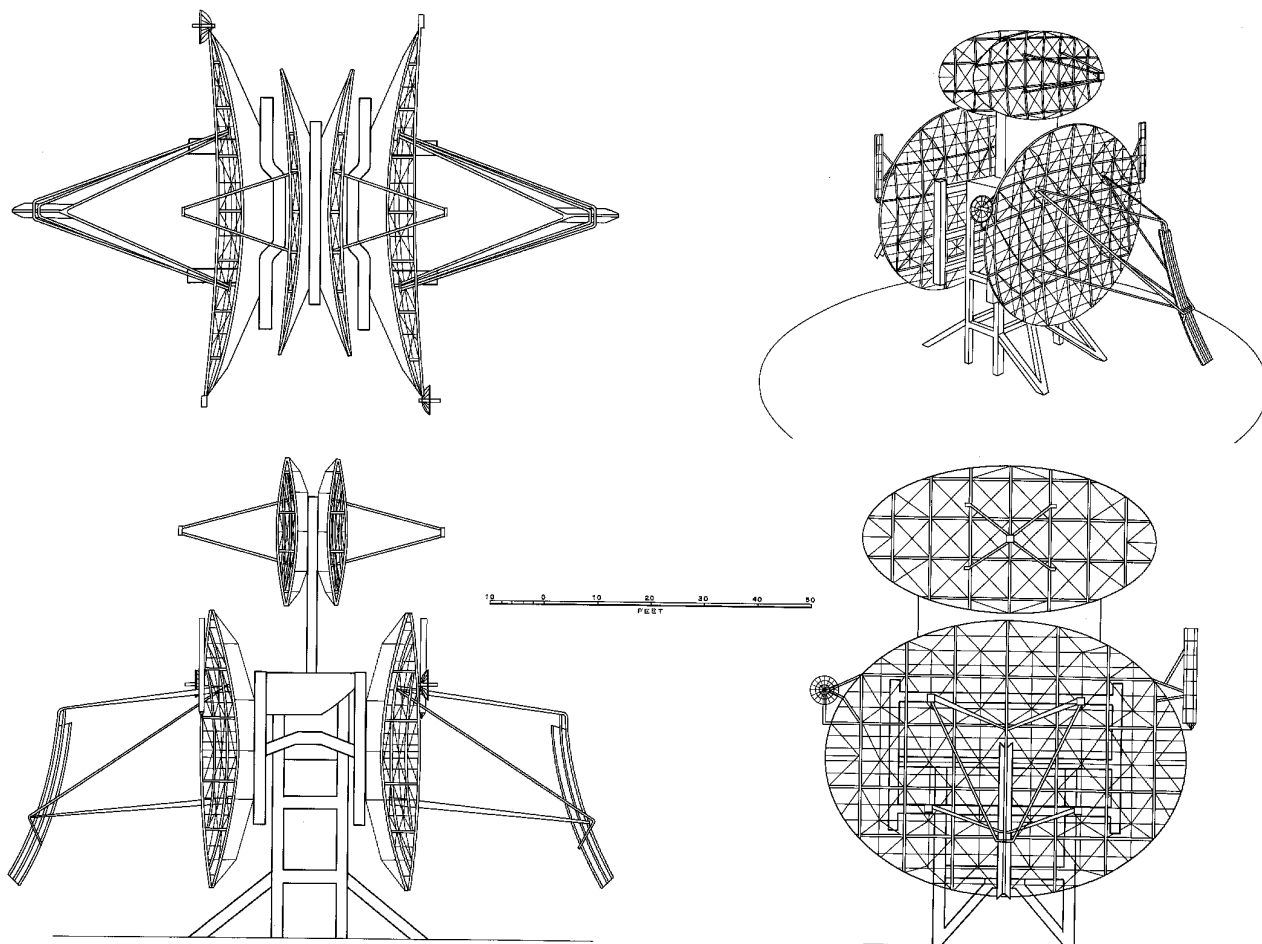


FIGURE 15. LINE DRAWINGS OF ELECTRONIC SITES C1 AND C2 RADAR ARRAY.

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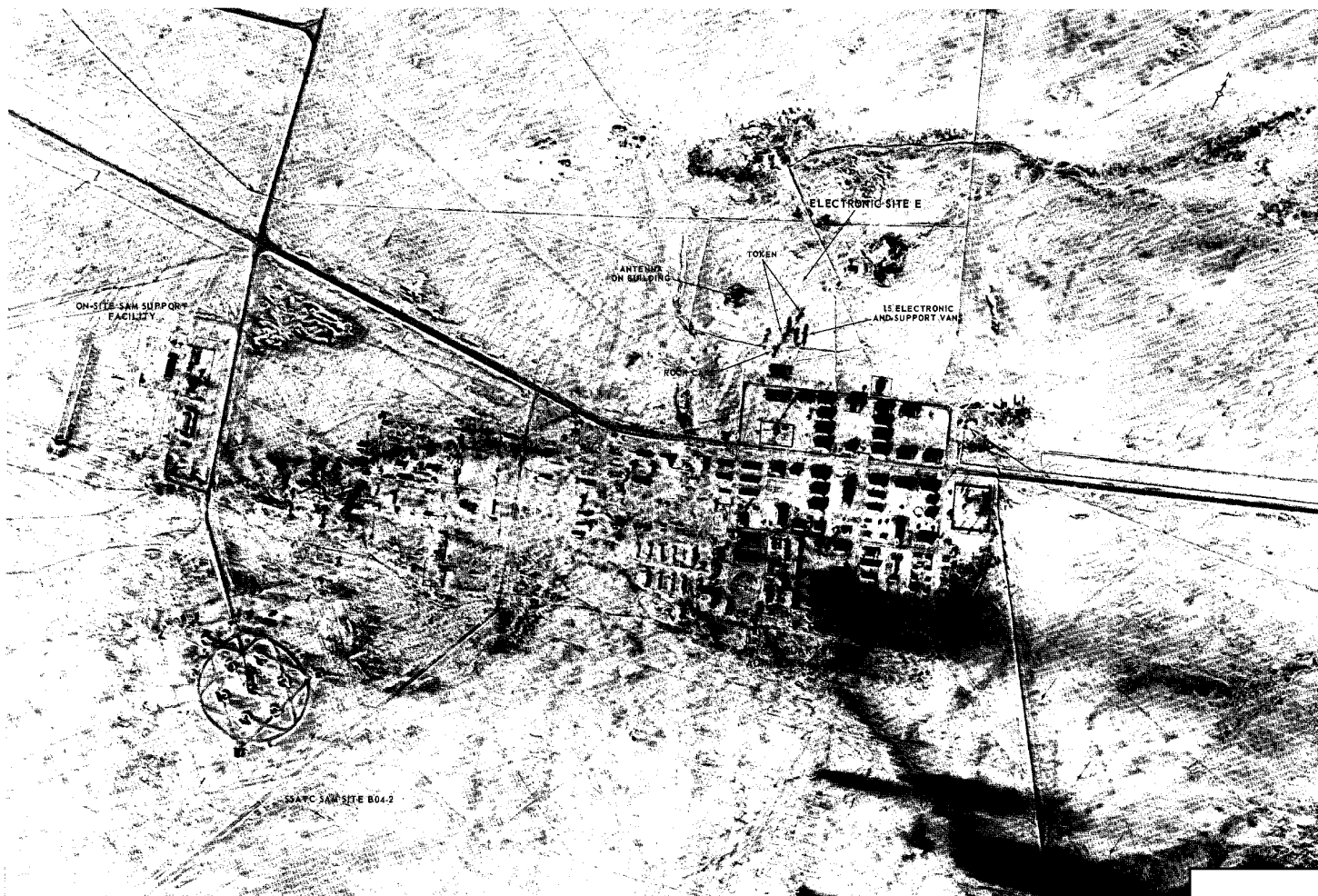


FIGURE 16. ELECTRONIC SITE E.

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the waveguide to whistle in the wind. Also, the waveguide does not appear sufficiently braced to prevent vibration at a fast rate of rotation. It would appear, therefore, that vibration or jitter would introduce spherical aberrations caused by the rapid movement of the waveguide about the foci. The alternative is a slow rate of rotation which raises the question, would the data rate available from a slow rotation be sufficient for guidance. It appears, then, that this array is too slow for guidance. Another fact to keep in mind is that the antenna shown in Figure 12 was observed at Mytishchi as early as [REDACTED]

Electronic Site C3. The antenna at Electronic Site C3 is under an environmental dome 50 feet in diameter and cannot be specifically identified. Based on its inferred size and the following considerations, Electronic Site C3 is interpreted to be the final tracking radar facility and possibly

guidance for Launch Sites 5 and 6.

If the array at Electronic Site C1 is not suitable for high data rate information, then Electronic Site C3 must be the final tracking radar facility since there are no other radars in the area.

The positioning of Electronic Site C3 with respect to Launch Sites 5 and 6 is also considered significant. Electronic Site C3 has been precisely placed so that the antenna forms an equilateral triangle with the northernmost launcher in both Launch Sites 5 and 6 (Figure 13).

#### Electronic Site D

Electronic Site D (Figure 2) contains a self-supporting, steel, lattice-work tower. The self-supporting tower is 375 feet high and has 2 MERCURY PLATE-type antennas at the very top which are set diagonally with respect to the

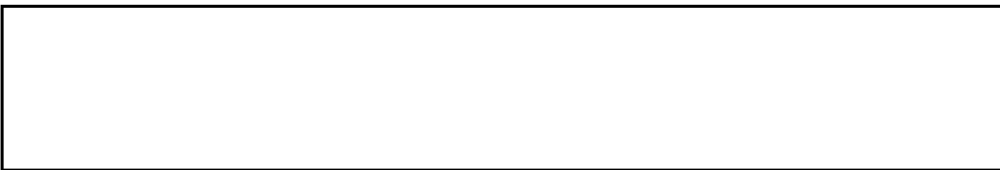
horizon. It is not determinable from available photography whether the antennas are utilized for microwave communications or radar calibration. Its location with respect to radars C1 and C2 infers calibration.

#### Electronic Site E

Electronic Site E (Figure 16) contains 2 TOKEN radars and a ROCK CAKE radar on top towers 25 feet high. The function of the site is considered to be range safety and, if combined with the electronic vans at the base of the towers, field-transportable communications. The site is supported by approximately 17 electronic vans and several generators. A building just northwest of the radar-communications site has an unidentified antenna on its roof which is probably used for microwave communications.

#### REFERENCES

##### PHOTOGRAPHY



##### MAPS OR CHARTS

ACIC. USAF Operational Navigational Chart, Sheet ONC-F-6, 1st classified edition, 30 Aug 61, scale 1: 1,000,000 (CONFIDENTIAL)

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3. Regelin, K., ed. "USS Bainbridge," *Interavia International Defense Review*, Vol 12, Dec 65, Geneva, p 1818-1819 (UNCLASSIFIED)
4. Regelin, K., ed. "Shapes of Naval Radar," *Interavia International Defense Review*, Vol 12, Dec 65, Geneva, p 1820-1823 (UNCLASSIFIED)

##### RELATED DOCUMENT

NPIC. R-423/64, *Electronic Site C, Launch Complex A, Sary-Shagan Antimissile Test Center, USSR*, Jun 64 (TOP SECRET [REDACTED])

##### REQUIREMENTS

CIA. C-815-82, 245  
CIA. C-815-82, 245, Supplement 1

##### NPIC PROJECT

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